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FOREST SERVICE

A N N U A L R E P O R T

ON

THE CONTROL OF WHITE PINE BLISTER RUST

IN CALIFORNIA

FOR THE CALENDAR YEAR 1963

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BLISTER RUST CONTROL IN CALIFORNIA - 1963

The white pine blister rust control program in California has three interrelated objectives: indirect control of the disease by means of ribes suppression, direct control through the use of chemical fungicides applied directly to infected trees, and the development of rust-resistant sugar pine hybrids.

At the present time, selected white pine stands in California are protected principally through the suppression of ribes populations. These plants, which are alternate hosts for the disease, are eradicated mainly by hand grubbing; most of the work is performed under contract. A small amount of eradication work is done in light ribes populations by hired technicians. A variety of operational surveys are conducted both under contract and by seasonal employees.

The use of chemical fungicides to treat infected trees is still in the development stage in California. Field tests have not yet shown results successful enough to justify large-scale operational applications.

The development of rust-resistant hybrids is a long-term genetics project being conducted as a part of the California Region's over-all tree improvement program. Over 100 naturally resistant candidates have been located in heavily infected stands. These are being tested for their ability to pass on a degree of this resistance to their progeny.

BLISTER RUST CONTROL IS A COOPERATIVE UNDERTAKING

The control of white pine blister rust in California involves the cooperation of several State and Federal agencies and numerous representatives of California's forest industry. The cooperators and their principal roles in the program are:

The State of California: Through its continued interest and substantial financial support the State of California makes possible the protection of sugar pine stands on approximately 170,000 acres of privately owned forest land. Control work is financed jointly; the contribution of private owners plus the Federal appropriation is matched by the State. Where the owner does not contribute financially, but agrees to manage the stand for sugar pine production, the State and Federal Government share the cost of protection.

Control operations on State and private lands are carried out by the Forest Service under a cooperative agreement with the State of California. Eight National Forests perform the work with technical assistance and coordination from the Regional Office of the Forest Service in San Francisco and from the California Division of Forestry.

Some ribes eradication work on State and privately owned lands is done by crews from State Conservation Camps as a part of the State Cooperative Project. About 12,000 acres of State forests and parks are included in protection units; here the work is financed entirely by the State. The University of California, manager of Blodgett Experimental Forest, is also an active participant in the program. Control accomplishments on State and private lands are reported in the accompanying tables under the heading, "Work Done by the State Cooperative Project."

Industry: Individual forest landowners in California may participate directly by entering cooperative agreements with the Forest Service and the State of California. They are encouraged to contribute up to 25 percent of the cost of control.

California's forest industry participates indirectly through the California Forest Pest Control Action Council, which periodically reviews progress of the blister rust control program and makes appropriate recommendations to the State Board of Forestry.

National Park Service: The National Park Service has selected for protection outstanding white pine stands throughout the National Parks in California. At the present time these units, in which five species of white pine are represented, comprise 160,000 acres. Control work is done by the Parks with the technical assistance of the Forest Service.

Forest Service: One of the Forest Service's main responsibility in blister rust control is for over-all leadership, technical direction and coordination of control work on lands of all ownerships. This is provided by the Division of Timber Management of the San Francisco Regional Office, and the Pacific Southwest Forest and Range Experiment Station in Berkeley. In addition, ten National Forests have active sugar pine management programs. At present National Forest sugar pine management units include 290,000 acres.

The field operations needed to carry out the State Cooperative Project and National Forest Project are identical and frequently involve intermingled lands; for this reason the two projects are conducted as a single integrated operation by individual National Forests.

RECENT POLICY CHANGES

All continuing pest control operations must receive periodic review and reappraisal if they are to remain technically and administratively sound. From the beginning the white pine blister rust control program in California has been subject to such scrutiny and has undergone repeated

modifications in accordance with changing conditions. In cooperation with the Pacific Southwest Forest and Range Experiment Station, the Forest Service last year completed a comprehensive review of the entire program and found some procedural and policy changes were needed. The principal changes, which are largely changes in emphasis rather than major departures from earlier policy, are listed below:

1. Further ribes eradication, except in sugar pine plantations, was deferred in the Coast Range south of the Yolla Bolly Mountains. (Infection conditions here are similar to those in the southern Sierra Nevada where a similar deferment took place in 1960, and blister rust is not expected to be a serious pest.)

2. Ribes eradication standards were relaxed sharply in the central Sierra Nevada and to a lesser degree in portions of the Lassen and Plumas National Forests where rust is not present.

3. Close control standards were continued on the Klamath and Shasta-Trinity National Forests and in known infection centers elsewhere.

4. Much greater emphasis will be devoted to continuing, regularly-scheduled rust detection and surveillance activities in control units, particularly at locations where infection has occurred.

RIBES ERADICATION AND SURVEYS

In 1963, ribes were eradicated from 24,000 acres of Federal and privately owned land, and approximately 110,000 acres were surveyed; no work was needed on State land. Over 18,000 acres of the ribes eradication work was done by contractors at an average price of $7.44 per acre. Crews from the Intermountain and Plum Creek State Conservation Camps completed 460 acres of initial work on private land. The remaining ribes eradication, mostly maintenance work, was done by hired technicians.

Lassen Volcanic National Park: Work in many control units is on a long-term maintenance basis and will require very little further attention. In recent years Lassen Park has been reappraising its white pine stands regarding blister rust protection needs and expects complete all control unit delineation in the Park in the near future. In 1963, 713 acres were deleted and 1,242 acres were added to the units; the latter were mainly in the Warner Valley area.

Yosemite National Park: All sugar pine stands within control units are rapidly approaching a maintenance status. In 1963, 9,526 acres were added to maintenance, bringing the Park total to 71,561 acres or 85 percent of the total protected sugar pine acreage placed on maintenance

status. All eradication was done by skilled technicians who also worked on ribes surveys. Due to the small amount of eradication work needed, the Park has not conducted an eradication contract program since 1961.

DIRECT CONTROL

Tests of various chemicals for the control of blister rust cankers have been conducted by the Division of Timber Management and several National Forests in northern California since 1957. (Similar testing has been underway by the Pacific Southwest Forest and Range Experiment Station. Their results are similar, but are not reported here.) To date, 191 tests involving ten fungicides and 1,360 sugar pine trees have been made. Methods of application include direct treatment of cankers and indirect treatment by means of translocation from either foliage (aerial) or basal stem application. Several combinations of carrier and concentration have been used for each fungicide. The majority of the tests were made in the period 1959-1962. All tests were read in 1963 with the following results:

1. Several fungicides have given successful results when applied directly to relative young bole cankers. Additional readings in 1964 will be needed to confirm this, but it appears that a direct-treatment prescription for operational use on young bole cankers will be possible in the near future. However, since considerable time is involved in direct treatment, this procedure will be rather costly and of limited application.

2. Response of indirectly treated bole cankers has been more erratic and far less successful. As yet there is not a single tree on which any of the indirectly-applied fungicides has succeeded in killing all the potentially damaging cankers outside of the treatment zone. Further readings may modify this finding, but at the present time it seems unlikely that an operational basal stem procedure will emerge from the tests made to date.

   The aerial application tests are more recent than most of the basal stem tests and therefore the results from them are tentative.

RUST-RESISTANT SUGAR PINE

The rust-resistant sugar pine project which started in 1957 continues as a part of the Region's Forest Tree Improvement Program. Approximately 100 rust-resistant candidates have been located. Several of these candidates were subsequently abandoned. No additional searching for rust-resistant candidates was done during 1963.

All trees and other vegetation were removed from a 66-foot circle surrounding ten of the better candidates in a pilot study to determine if the release from competition would result in greater flower initiation.

Of the 52 candidates examined this year, 34 produced pollen in collectable quantities. Since pollen has been scarce in past years, 1963 pollen was frozen and stored for possible use in 1964. Thirteen candidates had female flowers suitable for pollination. The pollination phase of the program consisted of 121 successful pollinations producing 188 conelets. This included 70 cross pollinations.

Outplantings of 135 potted grafts were made at the Badger Hill archives plot on the Eldorado National Forest, and 134 potted grafts and 504 progeny were outplanted at the Happy Camp testing site on the Klamath National Forest.

A second artificial inoculation of rust-resistant sugar pine progenies and grafted stock was made in the fall of 1963 to determine which combination of crosses yields the greatest resistance. The results of this test and of the similar test made in 1962 will not be available until 1964 at the earliest.

RUST SPREAD AND INTENSIFICATION IN 1963

White pine blister rust was more plentiful on ribes in the northern end of the State than usual, due to spring and summer rains. Since this is the portion of the State where the rust has caused severe damage to sugar pine (and very little of the area is within control units) the heavy ribes infection has little economic significance. No extension of the known range of blister rust in the Sierra Nevada was reported in 1963, so that Dodge Ridge on the Stanislaus National Forest remains the point of southernmost penetration.

TABLE 1

STATUS OF RIBES ERADICATION IN CALIFORNIA AS OF DECEMBER 31, 1963

Ownership	Control Operation	Control Units		Status of Ribes Eradication			
				Net Acres by Workings			Acres on Maint.
		Total Acres	Acres Unworked	Initial	Reerad.	Maint. Work	
WORK DONE BY THE STATE COOPERATIVE PROJECT							
PRIVATE LAND	Mendocino (Glenn County)						
	Klamath (Siskiyou County)	2,300		2,300	3,974	2,449	2,300
	Shasta-Trinity (Siskiyou and Shasta Counties)	4,321		4,321	6,529		221
	Modoc (Siskiyou and Modoc Counties)	8,489	3,391	5,098	1,263		917
	Lassen (Tehama, Butte, Plumas, and Shasta Counties)	65,497	17,474	48,023	70,737	4,804	34,509
	Plumas (Plumas, Butte, Yuba, and Sierra Counties)	24,281	3,337	20,944	45,169		1,860
	Tahoe (Sierra, Nevada, and Placer Counties)	1,585		1,585	1,539	6	481
	Eldorado (Eldorado, Placer, and Amador Counties)	41,798	7,646	34,152	70,055	137	8,320
	Stanislaus (Calaveras and Tuolumne Counties)	8,112	316	7,796	20,131	91	4,181
	Sierra* (Mariposa, Madera, and Fresno Counties)	14,422	1,285	13,137	12,009	66	620
	TOTAL	170,805	33,449	137,356	231,406	7,553	53,409
STATE LAND	Latour State Forest	3,109	829	2,280	1,973	53	1,732
	Blodgett Forest-Univ. of Calif.	940		940	2,859		
	D. L. Bliss-Emerald Bay State Parks	2,280	40	2,240	89		1,203
	Calaveras Big Trees State Park	5,073	814	4,259	10,230		3,061
	Mountain Home State Forest*	878	130	748	395		
	TOTAL	12,280	1,813	10,467	15,546	53	5,996
TOTAL STATE AND PRIVATE		183,085	35,262	147,823	246,952	7,606	59,405
WORK DONE BY THE FOREST SERVICE							
NATIONAL FOREST LAND	Mendocino	8,521	6,936	1,585	1,080		
	Klamath	2,238		2,238	2,326	803	2,238
	Shasta-Trinity	11,869	314	11,555	7,942		721
	Modoc						
	Lassen	38,716	21,026	17,690	16,214	847	8,068
	Plumas	73,403	19,526	53,877	72,803		4,190
	Tahoe	22,569	2,419	20,150	19,752	332	4,507
	Eldorado	37,319	8,453	28,866	44,425	10	4,941
	Stanislaus	43,965	1,272	42,693	98,850	1,520	24,814
	Sierra*	49,578	19,293	30,285	44,415	51	500
	Sequoia*	4,974		4,974	3,609		560
	TOTAL	293,152	79,239	213,913	311,416	3,563	50,539
WORK DONE BY THE NATIONAL PARK SERVICE							
NATIONAL PARK LAND	Lassen Volcanic	27,313	1,129	26,184	28,840	4,369	23,720
	Yosemite	83,952	2,222	81,730	110,816	14,684	71,561
	Sequoia-Kings Canyon*	50,576	2,400	48,176	59,661	8,322	42,667
	TOTAL	161,841	5,751	156,090	199,317	27,375	137,948
ALL WORK DONE IN CALIFORNIA							
ALL CONTROL OPERATIONS		638,078	120,252	517,826	757,685	38,544	247,892

* Inactive control operations. Data are as of December 31, 1960.

TABLE 2

SUMMARY OF RIBES ERADICATION IN CALIFORNIA - 1963

Ownership	Control Operation		Acres Worked	Eradication Man Days	Thousands of Ribes Destroyed	Acres Surveyed	Contract Eradication	
							Acres Worked	Average Price Per Acre Paid to Contractor
WORK DONE BY STATE COOPERATIVE PROJECT								
PRIVATE LAND	Klamath (Siskiyou County)		250	30	5			
	Shasta-Trinity (Siskiyou and Shasta Counties)		901	189	14	2,790	901	$7.96
	Modoc (Siskiyou and Modoc Counties)		1,156	935	58	4,457	696	5.03
	Lassen (Tehama, Butte, Plumas, and Shasta Counties)		2,620	411	83	10,133	2,444	4.30
	Plumas (Plumas, Butte, Yuba, and Sierra Counties)		1,743	892	684	9,210	1,236	13.02
	Tahoe (Sierra, Nevada, and Placer Counties)		92	18	1	558	86	5.00
	Eldorado (Eldorado, Placer, and Amador Counties)		1,050	221	70	3,445	539	6.41
	Stanislaus (Calaveras and Tuolumne Counties)		371	99	51	1,864	371	7.37
	Sierra* (Mariposa, Madera, and Fresno Counties)							
STATE LAND	Latour State Forest		119	9	2	1,540	119	2.53
	Blodgett Forest-Univ. of Calif.					120		
	D. L. Bliss-Emerald Bay State Parks							
	Calaveras Big Trees State Park					1,449		
	Mountain Home State Forest*							
ALL WORK DONE BY THE STATE COOPERATIVE PROJECT		Initial	1,732	1,251	108			
		Reeradication	5,544	1,409	834			
		Maintenance	1,026	144	26			
		All	8,302	2,804	968	35,566	6,392	$6.95
WORK DONE BY THE FOREST SERVICE								
NATIONAL FOREST LAND	Mendocino		25	102	14			
	Klamath		28	10	4			
	Shasta-Trinity		681	143	10	3,798	681	4.26
	Modoc							
	Lassen		1,679	540	189	7,665	1,665	6.46
	Plumas		4,819	2,391	808	27,255	3,874	9.91
	Tahoe		2,834	926	172	10,423	2,446	8.31
	Eldorado		2,101	457	214	5,318	1,593	5.49
	Stanislaus		2,110	418	132	5,913	1,340	6.53
	Sierra*							
	Sequoia*							
ALL WORK DONE BY THE FOREST SERVICE		Initial	1,811	1,273	450			
		Reeradication	11,426	3,561	1,082			
		Maintenance	1,040	153	11			
		All	14,277	4,987	1,543	60,372	11,599	$7.75
WORK DONE BY THE NATIONAL PARK SERVICE								
NATIONAL PARK LAND	Lassen Volcanic		553	193	27	2,113	381	6.30
	Yosemite		931	294	14	11,783		
	Sequoia-Kings Canyon*							
ALL WORK DONE BY THE NATIONAL PARK SERVICE		Initial	437	163	10			
		Reeradication	102	28	16			
		Maintenance	945	296	15			
		All	1,484	487	41	13,896	381	$6.30
ALL WORK DONE IN CALIFORNIA								
ALL OWNERSHIPS ALL AGENCIES		Initial	3,980	2,687	568			
		Reeradication	17,072	4,998	1,932			
		Maintenance	3,011	593	52			
		All	24,063	8,278	2,552	109,834	18,372	$7.44

* Inactive control units.